Marine Mammal Monitoring and Mitigation Plan

Prepared for

Port of Anchorage

2000 Anchorage Port Road
Anchorage, Alaska 99501
United States of America

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Prepared by

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Acronyms and Abbreviations

APMP	Anchorage Port Modernization Project
BA	Biological Assessment
dB	decibels
ESA	Endangered Species Act
FR	*Federal Register*
ICRC	Integrated Concepts and Research Corporation
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
MMO	Marine Mammal Observer
MOA	Municipality of Anchorage
µPa	microPascal(s)
NMFS	National Marine Fisheries Service
POA	Port of Anchorage
rms	root mean square

SECTION 1.0

1 Introduction

The Municipality of Anchorage (MOA), through its Port of Anchorage (POA) department, is requesting an IHA for the take of small numbers of marine mammals, by Level B behavioral harassment only, incidental to implementation of a Test Pile Program near its existing facility in Anchorage, Alaska. The following Marine Mammal Monitoring and Mitigation Plan (Monitoring Plan) was prepared in support of the request for an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA), and in support of the Biological Assessment (BA) for formal Section 7 consultation with NMFS under the Endangered Species Act (ESA).

The Port is located on Knik Arm in upper Cook Inlet. It provides critical infrastructure for the citizens of Anchorage and a majority of the citizens of the state of Alaska. Approximately 74 percent of all non-fuel freight moving through Southcentral is transported through the POA. The POA moves approximately 30 percent of all refined petroleum product consumed in the state (not including the panhandle) and 95 percent of all refined product moving through Southcentral ports (McDowell 2015). It is a Defense Designated National Strategic Seaport. The existing marine-side infrastructure and support facilities at the POA are in need of repair or replacement because of their age, condition, or functional obsolescence. None of the existing wharves are constructed to current seismic standards. The POA is identifying and updating a plan for modernizing its facilities through the Anchorage Port Modernization Project (APMP). An initial step in the APMP is implementation of a Test Pile Program, which involves the installation of 10 indicator test piles in the area of future APMP development.

The Test Pile Program is expected to produce noise levels that could exceed Level A (injury) and Level B (disturbance) harassment thresholds established by NMFS for marine mammals under the MMPA (70 Federal Register [FR] 1871-1875). Level A harassment means any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment means any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but that does not have the potential to injure a marine mammal or marine mammal stock in the wild.

NMFS has defined levels of harassment for marine mammals under water as:

- **Level A Harassment – injury by continuous or impulse noise**: NMFS has established a "do not exceed" exposure criterion of 180 decibels (dB) re 1 microPascal (µPa) root mean square (rms) for cetaceans and 190 dB re 1 µPa rms for pinnipeds.
- **Level B Harassment – harassment by impulse noise** (e.g., impact pile driving) is set at 160 dB re 1 µPa rms.
- **Level B Harassment – harassment by continuous noise** (e.g., vibratory pile driving) is set at 120 dB re 1 µPa rms (70 FR 1871-1875).

For the POA Test Pile Program, the use of 125 dB rms as the ambient noise level was approved in a letter from NMFS dated 17 November 2015 (NMFS 2015). The Level B harassment zone for continuous noise (e.g., vibratory pile driving) for the POA Test Pile Program is therefore also set at 125 dB rms.

Beluga whales (*Delphinapterus leucas*), harbor seals (*Phoca vitulina*), and harbor porpoises (*Phocoena phocoena*) may be encountered in the POA project area or vicinity, and a small number of Level B takes was requested for these marine mammals. In addition, killer whales (*Orcinus orca*) and Steller sea lions (*Eumetopias jubatus*) may occur infrequently in northern Cook Inlet and a small number of Level B takes was also requested for these species. No Level A takes are expected as a result of the Test Pile Program and no Level A takes were requested in the IHA. All marine mammals are protected under the MMPA; the Cook Inlet beluga whale and the western Distinct Population Segment of Steller sea lions are also listed as endangered under the ESA.

To minimize potential impacts of construction noise on marine mammals, Marine Mammal Observers (MMOs) will be on site during all in-water pile installation activities associated with the Test Pile Program. MMOs will search for, monitor, and track marine mammals around and within the harassment zones.

The overall goal of the Monitoring Plan is to ensure compliance with the MMPA and ESA during in-water pile installation activities associated with the Test Pile Program. Detailed information on the project and potential effects on marine mammals can be found in the IHA application.

SECTION 2.0

2 Marine Mammal Monitoring

To minimize impacts of project activities on marine mammals, MMOs will be present at the project site during all pile installation activities. MMOs will search for, monitor, document, and track marine mammals around and within the Level A and Level B harassment zones (see Section 3.1).

2.1 Monitoring Overview

The POA is planning for pile driving to take place from approximately 01 April 2016 to 01 July 2016. However, due to unexpected project delays and other unforeseeable circumstances, the requested authorization period for the Test Pile Program is for the 1-year period from 01 April 2016 to 31 March 2017.

2.1.1 Communication Systems

A clear authorization and communication system will be in place to ensure MMOs, hydroacoustic monitoring crews, and pile-installation crews will understand their roles and responsibilities before beginning field work.

The POA shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, acoustic monitoring team, and staff prior to the start of all in-water pile driving, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

Each MMO will be trained and provided with reference materials to ensure standardized communication systems and accurate observation and data collection methods will be used. All crews will communicate marine mammal sightings to ensure field personnel are aware that marine mammals are in the area. The MMOs and pile installation crew will work collaboratively to ensure shutdown recommendations can be made and if necessary, acted upon.

2.1.2 Visual Land-based Monitoring

Four MMOs shall work concurrently in rotating shifts to provide full coverage for marine mammal monitoring during in-water pile installation activities for the Test Pile Program (HDR 2011). One MMO shall observe the 100 m shutdown zone and two MMOs shall scan the relevant beluga shutdown zone. For pile driving without the use of sound attenuation systems, one MMO shall observe the 100 m shutdown zone and two MMOs shall observe the 1,400 and 4,000 m zones for impact and vibratory pile driving, respectively. For pile driving with the use of sound attenuation systems, (1) during impact pile driving one MMO shall observe the 100- and 300-m shutdown zones and two MMOs shall observe the larger behavioral harassment zone and (2) during vibratory pile driving two MMOs shall observe the 100- and 900-m shutdown zones and one MMO shall observe the larger behavioral harassment zone. Four MMOs shall rotate through these three active positions every 30

minutes. The fourth MMO shall record data. A theodolite will also be used for observations and data collection.

Before the Test Pile Program commences, MMOs and POA authorities will meet to determine the most appropriate observation platform(s) for monitoring during pile driving. Considerations will include:

- Height of the observation platform, to maximize field of view and distance
- Ability to see the shutdown zones established in the IHA
- Safety of the MMOs, construction crews, and other people present at the POA
- Minimizing interference with POA activities

Height and location of an observation platform are critical to ensuring that MMOs can adequately observe the harassment zone during pile installation. The platform should be mobile and able to be relocated to maintain maximal viewing conditions as the construction site shifts along the waterfront. Past monitoring efforts at the POA took place from a platform built on top of a cargo container or a platform raised by an industrial scissor lift (ICRC 2011, 2012). A similar raised, mobile observation platform will likely be used for the Test Pile Program.

The minimum radial distances required for monitoring zones for all pile driving shall be a minimum of 1,400 and 4,000 m for impact and vibratory pile driving, respectively (Table 2-1), which are equivalent to the Level B harassment zones (see Section 3.1). Monitoring effort and the sizes of the monitoring zones will not vary with use of noise mitigation methods during pile installation. MMOs will also observe around the outer boundaries of the harassment zones to determine whether marine mammals are approaching the project area.

Table 2-1 Required monitoring zones and Level B harassment zones for belugas and other marine mammals

Pile Activity	Unattenuated Piles		Attenuated Piles	
	Belugas	Other Marine Mammals	Belugas	Other Marine Mammals
Impact	1,400 m	1,400 m	1,400 m	1,400 m
Vibratory	4,000 m	4,000 m	4,000 m	4,000 m

MMOs will begin observing for marine mammals within the monitoring zones for 30 minutes before in-water pile driving begins. If a marine mammal other than a beluga whale is traveling along a trajectory that could take it into the 1,400 and 4,000 m zones for impact and vibratory pile driving, respectively, the MMO shall record the marine mammal(s) as a "take" upon entering those zones. While the animal remains within the 1,400 and 4,000 m zones, that pile segment may be completed without cessation, unless the animal approaches the 100 m shutdown zone, at which point the MMO shall authorize the immediate shutdown of in-water pile driving before the marine mammal enters the 100 m shutdown zone. Pile driving shall resume only once the animal has left the 100 m shutdown zone on its own or has not been re-sighted for a period of 30 minutes.

If, during the driving of attenuated piles, one or more beluga whales is traveling along a trajectory that could take it into the 1,400 and 4,000 m zones for impact and vibratory driving, respectively, the MMO shall record the beluga whale(s) as a "take" upon entering that zone. While the animal remains within those zones, that pile segment may be completed without cessation, unless the animal approaches the relevant beluga shutdown zone, at which point the MMO shall authorize the immediate shutdown of in-water pile driving before the marine mammal enters the relevant shutdown zone.

Monitoring of the Level A and Level B harassment zones will continue for 30 minutes following the completion of pile installation each day. Sections 3.3 and 3.4 provide additional detail on start-up and shutdown procedures.

2.1.3 Visual Boat-based Monitoring

In order to more effectively monitor the larger Level B harassment zone for vibratory pile driving, an MMO may be placed on one of the vessels used for hydroacoustic monitoring, which will be stationed offshore. The necessity for this will be determined once the land-based observation location(s) have been selected and the view field has been assessed. The hydroacoustic monitoring crew will be in radio contact with MMOs on land, even if no MMO is present on the boat. Even though marine mammal monitoring is not the hydroacoustic monitoring crew's primary responsibility, the crew will contact the MMOs if marine mammals are sighted.

2.2 Marine Mammal Observer Qualifications

All MMOs must be capable of spotting and identifying marine mammals and documenting applicable data during all types of weather, including rain, sleet, snow, and wind. All MMOs must also be comfortable with handling the authority to stop work when necessary. At a minimum, all MMOs will meet the following qualifications:

- Visual acuity (correction is permissible) sufficient to allow detection and identification of marine mammals at the water's surface. Use of binoculars may be necessary to correctly identify the target to species.
- Demonstrated ability to conduct field observations and collect data according to assigned protocols (this may include academic training and/or previous field experience).
- Experience or training in field identification of marine mammals.
- Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
- Ability to communicate orally, by radio or in person, with project personnel about marine mammals observed in the area.
- Experience or training in the use of a theodolite in order to track the movements of marine mammals.
- Ability to collect the required marine mammal observation data as detailed in Section 2.3.

All MMOs will undergo project-specific training, which will include training in monitoring, data collection, theodolite operation, and mitigation procedures specific to the project. This

training will also include site-specific health and safety procedures, communication protocols, and refresher training in marine mammal identification and data collection.

A lead MMO will always be on site and will remain responsible for implementing the Monitoring Plan throughout the entire Test Pile Program. The lead MMO must have the education and experience that demonstrates his or her qualifications to serve as the lead MMO, including the following minimum requirements:

- Education in wildlife observation techniques from a university, college, or other formal education program; and
- Previous professional marine mammal observation experience.

2.3 Data Collection

Data collected regarding environmental conditions, marine mammal sightings, communication with crews, and in-water project activities will be collected electronically through a computerized software system (i.e., Toughbook or iPad). Hardcopy paper forms will be available in case there are technical difficulties with equipment. Data collected on paper forms will consist of the same variables as will be collected electronically, and will include a map of the project site (Attachment A). Data entry will be checked for quality assurance and quality control by the lead MMO on a daily basis.

2.3.1 Environmental Conditions, Project Activities, and Communication

The MMOs will document monitoring efforts, environmental conditions, types of project activities, and any communications with the construction crew and hydroacoustic monitoring crew. MMOs will document the start and stop of all monitoring efforts. Environmental conditions will be documented at the beginning and end of every monitoring period and every half hour, or as conditions change. Data collected will include MMO names, location of the observation station, time and date of observation, weather conditions, air temperature, sea state, cloud cover, visibility, glare, tide, and ice coverage (if applicable). See Table 2-2 for more information on each of these attributes.

The MMOs will document type of project activities, including type of pile installation and sound attenuation method used, as well as the time of startup (or ramping up) and shutdown. Pile driving may be halted for a few hours or a full day, for the addition of pile sections or to accommodate welding or inspections. All shutdowns of in-water project activities will be documented. MMOs will also document all other, non-project-related activities that could be a potential disturbance to marine mammals in the area, such as the presence of vessels. MMOs, the hydroacoustic monitoring crew, and the construction crew will communicate information regarding startups, shutdowns, and marine mammal sightings. MMOs will maintain a log of communications.

Table 2-2 Environmental, project activities, and communication data attributes

Data Attribute	Attribute Definition and Units Collected
Environmental Conditions (collected every 30 minutes or when conditions change)	
Overall conditions	Poor, moderate, excellent
Weather conditions	Sunny (S), partly cloudy (PC), light rain (LR), steady rain (SR), fog (F), overcast (OC), light snow (LS), snow (SN)
Light conditions	Light, twilight, dark
Air temperature	Celsius
Wind speed	Knots
Wind direction	From the north (N), northeast (NE), east (E), southeast (SE), south (S), southwest (SW), west (W), northwest (NW)
Wave height	(0) Mirror-like, calm; (1) ripples (up to 4 inches); (2) small wavelets (up to 8 inches); (3) large wavelets (up to 2 feet); (4) small waves (up to 3 feet); (5) moderate waves (up to 6 feet)
Cloud cover	0–100%; amount of cloud cover
Visibility	Kilometers; maximum distance at which a marine mammal could be sighted
Glare	0–100%; amount of water obstructed by glare (0–100%) and grid cells affected by glare or the direction of glare
Tide	Predicted hourly data information gathered from National Oceanic and Atmospheric Administration will be available on-site
Ice coverage	0–100% amount of ice cover; type of ice (no ice present, new, brash, or pancake ice and floes)
Project and Communication Activities	
Time of communication or project activity	Time that in-water project activities and all communications between MMO and construction crews take place
Type of project activity and duration	No in-water activities, soft-start, shutdown, impact pile driving, vibratory pile driving, sound attenuation method used (air bubble curtains, encapsulated gas bubble, cushion blocks, resonance-based attenuation system)
MMO and construction crew members	Indicate individuals involved in any communication
Communication	Information communicated between MMO and construction crew

2.3.2 Sightings

All marine mammals observed will be documented. The data collected will include a unique group number specific to that day, start and end times of the sighting, species sighted, number of individuals, age class, color classification (only for beluga whales), behavior and movement, distance at first observation, closest observed distance from project activities, type of in-water project activity at the time of sighting, and whether and when project activities were stopped in response to the sighting (Table 2-3). The MMOs will also note any reaction of the marine mammal to project activities.

A color classification system will be used for beluga whales only. Whales will be documented as white, gray, or dark gray. This color classification will help estimate the age class of each animal. Adults are typically white, juveniles are gray, and calves are dark gray; however, the age at which a beluga whale's color matures to white is variable. Typically, skin coloration turns pure white by age 9; however, some females have been

documented to remain gray up to 21 years of age (Shelden 2011). The proximity of calves to their mothers will also be documented. Calves, especially neonates, typically remain in direct contact with their mothers. When known, sex and age classes for all other marine mammals will be documented.

The use of a surveyor's theodolite will be the primary method to track marine mammals once they have been observed. MMOs will use a theodolite to determine geographic location of the marine mammals and the distance between the marine mammals and the project activity. Once a marine mammal(s) has been sighted, a theodolite will be used to determine horizontal and vertical angles to each individual or group of marine mammals, which will be used to calculate their geographic coordinates and ascertain their position relative to the Level A and Level B harassment zones, and to record potential disturbances such as vessels (Prevel-Ramos et al. 2006). Potential indicators of negative responses to noise (e.g., a whale group approaches and then leaves, changes in swimming speed or direction, abrupt dives or dispersal) will be documented if observed (Kendall 2010). Any vessel movements or other activity to which the marine mammal could be responding will also be documented when possible. The MMOs will continue to track the marine mammal's movements using the theodolite during the entire sighting period.

A secondary method, the 500-meter by 500-meter grid system, may be used as a backup to track marine mammals if there are equipment difficulties. The 500-meter by 500-meter grid system is consistent with previous POA monitoring programs. Tracking marine mammals using the theodolite is the preferred method, because it is more accurate than the grid system. If the grid system is necessary, MMOs will use binoculars, range finders, and landmarks to determine marine mammal locations. MMOs will use a map overlain with a 500-meter by 500-meter grid and the harassment zones for plotting the specific location (see example map in Attachment A). The MMOs will draw the location of the initial and last sighting, the point of closest approach, and a line to show the path of the animal's movements during the sighting. The 500-meter by 500-meter grid may also be placed over theodolite tracks during data post-processing and Geographic Information System analysis for consistency with previous monitoring programs.

When marine mammals are sighted, MMOs should delegate responsibilities so that one or more MMOs continue to scan the water to identify other marine mammals potentially entering the area, while another MMO continues to monitor and track the first sighting.

Table 2-3 Marine mammal observation data attributes

Data Attribute	Attribute Definition and Units Collected
Marine Mammal Sighting Data	
Time of initial and last sighting	Time the animals are initially sighted and last sighted
Time animals entered and exited harassment zones	Time animals entered and exited harassment zones
Species observed	Identification of species observed: beluga whale, harbor seal, harbor porpoise, Steller sea lion, killer whale, or other species
Sighting cue	First observation: head, fluke, dorsal fin, body, splash, blow, birds feeding, porpoise, other
Number of individuals	Minimum and maximum number of animals counted; record the count the MMO believes to be the most accurate

Data Attribute	Attribute Definition and Units Collected
Color classification	Beluga whale color classification: white, gray, dark gray
Sex and age, if possible	Generally, numbers of females with pups or calves
Initial and final heading	Direction animals are headed when initially and last sighted
General pace	Sedate, moderate, vigorous
Theodolite readings	Horizontal and vertical angles used to determine location and distance from in-water project activities
Distances from marine mammal to in-water project activities and observation station	Distance from marine mammal to in-water project activities when initially sighted, at closest approach to activities, and at final sighting
In-water project activities at time of sighting	Type of project activities occurring at time of sighting; indicate shutdown times, if shutdown occurs
Other activities at time of sighting	Description of nearby activities occurring at time of sighting, such as presence, number, and activity of vessels nearby
Behavior	Behaviors observed, indicating primary and secondary behaviors
Change in behavior	Indication and description of changes in speed, direction, or other behaviors
Group cohesion	Orientation of animals within the group and the distances between animals

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SECTION 3.0

3 Mitigation Measures

3.1 Harassment Zones

Distances to the harassment thresholds, as defined by sound isopleths (Section 1), vary by marine mammal type and pile-installation method. Estimates of distances to the Level A injury and Level B harassment isopleths for the Test Pile Program were determined through consultation with NMFS (Table 3-1).

Table 3-1 Distances to the Level A injury and Level B harassment thresholds (isopleths) for a 48-inch-diameter pile, assuming a 125-dB background noise level and log 15 as the transmission loss value

Pile diameter (inches)	Impact			Vibratory		
	Pinniped, Level A Injury	Cetacean, Level A Injury	Level B Harassment	Pinniped, Level A Injury	Cetacean, Level A Injury	Level B Harassment
	190 dB	180 dB	160 dB	190 dB	180 dB	125 dB
48, unattenuated	14 m	63 m	1,359 m	<10 m	<10 m	3,981 m

m = meters

3.1.1 Impact Pile Driving

Distances to the unattenuated isopleths at 190 dB, 180 dB, and 160 dB for impact pile-driving 48-inch steel shell piles were determined to be 14, 63, and 1,359 meters, respectively.

3.1.2 Vibratory Pile Driving

For vibratory installation, the unattenuated distance to the 125-dB ambient level was determined to be 3,981 meters.

3.2 Acoustic Monitoring

An important component of the Test Pile Program is acoustic monitoring, which will occur simultaneously with pile installation. Monitoring will be used to determine the actual distances to the 190-dB, 180-dB, and 160-dB isopleths, which are used by NMFS to define the Level A injury and Level B harassment zones for pinnipeds and cetaceans for impact pile driving. The POA will also conduct acoustic monitoring during vibratory pile driving to determine the actual distance to the 120- and 125-dB isopleths for behavioral harassment relative to background noise levels (estimated to be 125 dB re 1µPa in the project area). If the real-time results of the monitoring indicate isopleth distances that differ greatly from those estimated in the Test Pile Program's IHA application, the POA, with NMFS' approval, may adjust the harassment zones accordingly in order to avoid take of marine mammals.

3.3 Shutdown Procedures

For all pile installation, the POA shall implement a minimum shutdown zone of 100 m radius around the pile for marine mammals other than beluga whales (Table 3-2) to prevent Level A take by injury. If a marine mammal passes the 100-meter shutdown zone prior to the cessation of in-water pile installation but does not reach the Level A harassment zone, there is no Level A take. For example, if notification of shutdown occurs when the marine mammals are 110 meters from in-water pile installation, but activities do not cease until the marine mammals have reached a distance of 90 meters from the in-water activities, no marine mammal reached the Level A harassment zone and therefore no marine mammals were taken by Level A harassment.

POA shall implement separate shutdown zones for beluga whales. When driving piles with the use of sound attenuation systems, these beluga shutdown zones shall be a minimum of 300 m and 900 m for impact and vibratory driving, respectively (Table 3-2). When driving piles without the use of sound attenuation systems, these shutdown zones shall be a minimum of 1,400 m and 4,000 m for impact and vibratory driving, respectively (Table 3-2). If a marine mammal comes within or approaches the relevant shutdown zone, such operations will cease.

Table 3-2 Required shutdown zones for belugas and other marine mammals

Pile Activity	Unattenuated Piles		Attenuated Piles	
	Belugas	Other Marine Mammals	Belugas	Other Marine Mammals
Impact	1,400 m	100 m	300 m	100 m
Vibratory	4,000 m	100 m	900 m	100 m

If shut down does occur, pile driving may not resume until the animal or group of animals is observed exiting the shut down zone or until 30 minutes have passed without re-sighting.

Pile driving will only take place when the relevant shutdown zones can be adequately monitored. Pile installation will not be initiated from a "shutdown condition" unless the shutdown zone can be adequately monitored for a continuous 30-minute pre-operational monitoring period. A shutdown condition is defined as a duration of 30 minutes or more when in-water noise from pile installation does not occur.

The lead MMO and POA will maintain running tallies of all "takes" that occur for each species. If the maximum authorized number of takes is reached or exceeded for the year, in-water pile installation operations will be shut down immediately. In addition, NMFS will be notified immediately and a revised plan will be developed before in-water pile installation activities will resume.

3.4 Startup Procedures

The project shall utilize soft start techniques for both impact and vibratory pile driving. POA shall initiate sound from vibratory hammers for 15 seconds at reduced energy followed by a 1-minute waiting period, with the procedure repeated two additional times. For impact driving, POA shall conduct an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 1-minute waiting period, then two subsequent three strike sets. Soft start shall be required at the beginning of each day's pile driving work and at any time following a cessation of pile driving of 30 minutes or longer (specific to either vibratory or impact driving). If a marine mammal that is not a beluga is sighted within the 100-meter shutdown zone prior to pile driving, or during the soft start, the hammer operator (or other authorized individual) will delay pile driving until the animal moves outside the 100-meter shutdown zone. Ramping up will begin only after the observer has determined, through sighting, that the animal(s) has moved outside the 100-meter shutdown zone or has not been re-sighted for a period of 30 minutes. If a beluga is sighted within the relevant shutdown zone prior to pile driving or during the soft start, as determined by the type of pile installation (Table 3-2), the hammer operator (or other authorized individual) will delay pile driving until the beluga moves outside the relevant shutdown zone. Ramping up will begin only after the observer has determined, through sighting, that the beluga(s) has moved outside the shutdown zone or has not been re-sighted for a period of 30 minutes.

If any marine mammal for which the POA Test Pile Program does not have incidental take authorization is present in a Level B harassment zone as described in Table 3-1, ramping up will be delayed until the animal(s) leaves the Level B zone for that pile installation method. Ramping up will begin only after the observer has determined, through sighting, that the marine mammal(s) has moved outside the Level B zone.

If a marine mammal for which the POA Test Pile Program has Level B incidental take authorization is present within the Level B harassment zone prior to the soft start and after the 30 minute monitoring period preceding in-water pile driving, the MMOs will either (1) delay the soft start until the marine mammal clears the zone, thereby avoiding a "take," or (2) document the marine mammal(s) as a "take" once the pile driver (vibratory or impact) has reached full power. If the soft start is delayed, the MMOs will continue to observe the Level B zone for 30 minutes until they are certain that the Level B harassment zone is clear of marine mammals, at which time they will authorize the soft start to begin.

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SECTION 4.0

4 Reporting

The contractor will provide a daily monitoring summary to the POA Construction Manager (or designee) that will include a summary of marine mammals sighted for each day of pile installation.

A draft report including data collected and a summary of marine mammal monitoring efforts and methods will be submitted to the POA Construction Manager within 60 days of the completion of hydroacoustic and marine mammal monitoring. The POA Construction Manager will provide review comments within 10 days of receipt of the draft report. The revised draft report will be submitted to NMFS within 90 calendar days of the completion of monitoring efforts or 60 days prior to the issuance of a subsequent authorization, whichever comes first. A final report shall be prepared and submitted within 30 days following resolution of any comments from NMFS on the draft report. The final report will be reviewed by the POA Construction Manager prior to submittal of the final report to NMFS. The report will include:

- A summary of acoustic monitoring methods and data collection
- A summary of monitoring effort and methods
- A summary of environmental conditions
- All marine mammal observations, including number of species, individuals, age class, color classification, behaviors, movement, and type of in-water project activity at the time of sighting
- A description of any observable marine mammal behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time
- An analysis of detectability of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within and outside harassment zones
- A refined take estimate based on the number of marine mammals observed in the harassment zones. This may be reported as either a rate of take (number of marine mammals per hour), or take based on density (number of individuals within the area).
- If applicable, the summary of any injured or dead marine mammals discovered.

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SECTION 5.0

5 References Cited

HDR, Inc. 2011. *Knik Arm Crossing Proof of Concept Study*. Prepared for Knik Arm Bridge and Toll Authority by HDR Alaska. December 2011.

ICRC (Integrated Concepts & Research Corporation). 2011. *2010 Annual marine mammal monitoring report*. Construction and Scientific Marine Mammal Monitoring Associated with the Port of Anchorage Marine Terminal Redevelopment Project, in accordance with the USACE 404/10 Permit and the NMFS 2010-2011 Letter of Authorization. Prepared U.S. Department of Transportation, Maritime Administration, Washington, DC; Port of Anchorage, Anchorage, AK by Integrated Concepts and Research Corporation, Anchorage, AK.

———. 2012. *2011 Annual marine mammal monitoring report*. Construction and Scientific Marine Mammal Monitoring Associated with the Port of Anchorage Marine Terminal Redevelopment Project, in accordance with the Letter of Authorization issued by the National Marine Fisheries for July 15, 2011 through July 14, 2012. Prepared for the U.S. Department of Transportation, Maritime Administration, Washington, DC; Port of Anchorage, Anchorage, AK by Integrated Concepts and Research Corporation, Anchorage, AK.

Kendall, L.S. 2010. *Construction impacts on the Cook Inlet beluga whale (*Delphinapterus leucas*) at the Port of Anchorage Marine Terminal Redevelopment Project*. Master's thesis, Alaska Pacific University.

McDowell Group. 2015. Southcentral Alaska Ports Freight and Fuel Analysis. Prepared by McDowell Group for Port of Anchorage.

NMFS (National Marine Fisheries Service). 2015. Letter from Jolie Harrison (Chief, Permits and Conservation Division, Office of Protected Resources, NMFS) to Dave Casey (Project Manager/Senior NEPA Planner, HDR) dated 17 November 2015.

Prevel-Ramos, A.P., T.M. Markowitz, D.W. Funk, and M.R. Link. 2006. *Monitoring beluga whales at the Port of Anchorage: Pre-expansion observations, August-November 2005*. Prepared by LGL Alaska Research Associates, Inc., Anchorage, Alaska, for Integrated Concepts and Research Corporation, the Port of Anchorage, Alaska, and the waterfront Department of Transportation Maritime Administration.

Shelden, K. 2011. *The endangered beluga whales of Cook Inlet, Alaska*. Quarterly Report. Prepared by Alaska Fisheries Science Center.

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Attachment A

Environmental and Marine Mammal Observation Datasheets

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Daily Environmental Conditions Log - Test Pile Program

(Recorded every 30 minutes or as conditions change)

Project:_____ Location:_____ Observer(s):_____ Date: _____

Time (hh:mm)	Overall Conditions (1 Poor, 2 Moderate, 3 Excellent)	Weather Conditions	Light Conditions (1 Light, 2 Twilight, 3 Dark)	Air Temperature (°C)	Wind Speed (knots)	Wind Direction	Sea State	Cloud Cover (%)	Visibility (km)	Glare (%)	Ice Coverage (%)	Type of Ice	Other Activity (Number, type, and general location of vessels or other sources of in-water disturbance)	Comments

Weather Conditions: (S) Sunny, (PC) Partly Cloudy, (L) Light Rain, (R) Steady Rain, (F) Fog, (OC) Overcast, (LS) Light Snow, (SN) Snow

Sea State: (0) Mirror like, calm; (1) ripples (up to 4 in) without foam crests; (2) small wavelets (up to 8 in); (3) large wavelets (up to 2 ft), perhaps scattered white horses; (4) small waves (up to 3 ft), fairly frequent white horses; (5) moderate waves (up to 6 ft); (6) large waves (up to 9 ft)

Type of ice: (N) New, (B) Brash, (PA) Pancake, (SF) Small Floes, (MF) Medium Floes, (LF) Large Floes, (BT) Belts, (S) Strips, (PI) Pack Ice, (NI) No Ice Present

Daily Project Activities and Communication Log - Test Pile Program

(Recorded every 30 minutes or as conditions change)

Project:_____ Location:_____ Observer(s):_____ Date: _____

In-Water Project Activities

Start Time (hh:mm)	Stop Time (hh:mm)	Type of Project Activity	Attenuation Method	Comments

Communication

Time of Communication	MMO (Initials)	Cons. Crew Member	Type of Comm.	Information Communicated

Type of Project Activities: No in-water, soft-start, shutdown, impact pile driving, vibratory pile driving

Attenuation Method: None, air bubble curtains, encapsulated gas bubble, cushion blocks, resonance-based attenuation system

Type of Communication: Shut Down Notification, Start Up Authorization, General Communication

Marine Mammal Sighting Form - Test Pile Program

Date: **Location:** **Take Count (for Sighting):**

Sighting #: **Observer(s):**

If Take occurs, report immediately

(1st sighting of the day is Sighting#: 1)

Time *(military)*		**Species** *(circle)*	**Distance** *(meters, animal to noise source)*		**Number of Animals**		**Number of Animals in Each Class**			
Initial Sighting Time		Beluga Whale	Initial Distance		Min Count		*Use Color Classification for Belugas Only:*			
Final Sighting Time		Harbor Seal	Closest Distance		Max Count		White		Gray	
Entered H-Zone B: Y or N		Harbor Porpoise	Final Distance		Best Count		Dark Gray		Unknown Color	
Time Entered H-Zone B		Steller Sea Lion	**Initial Heading** *(circle)*		**Number of Animals Entered H-Zone**		*Use classifications for other species:*			
Time Exited H-Zone B		Killer Whale	N NE NW W S SE SW E		H-Zone B		Adults		Calves/ Pups	
Entered H-Zone A: Y or N		other: _____	**Final Heading** *(circle)*				Juveniles		Unkn. Age	
Time Entered H-Zone A			N NE NW W S SE SW E		H-Zone A		Male		Female	
Time Exited H-Zone A							Unknown Sex			

Behavior of Marine Mammal *check all observed behaviors; place a 1 next to primary, 2 next to secondary activity):*

__ Travel __ Fight __ Mill __ Rest

__ Disoriented __ Play __ Dive __ Mate

__ Slap __ Spyhop __ Unknown Other:_____

__ Feeding Observed __ Swimming Toward __ Swimming Away from Site

Group Cohesion *(Orientation of animals within the group and the approx. distance between animals)* :

Initial Group Cohesion: Final Group Cohesion:

Changes in Behavior *(circle)* Y or N **Time of Behavior Change:** _____ **Change in behavior due to** *(circle)* **:**

Describe behavioral change & potential cause: Project Activites Other Activites

Project Activities

In-Water Work was occuring at initial sighting time? Y or N

In-Water Project Activities *(circle)* : No in-water soft-start shutdown impact pile driving vibratory pile driving

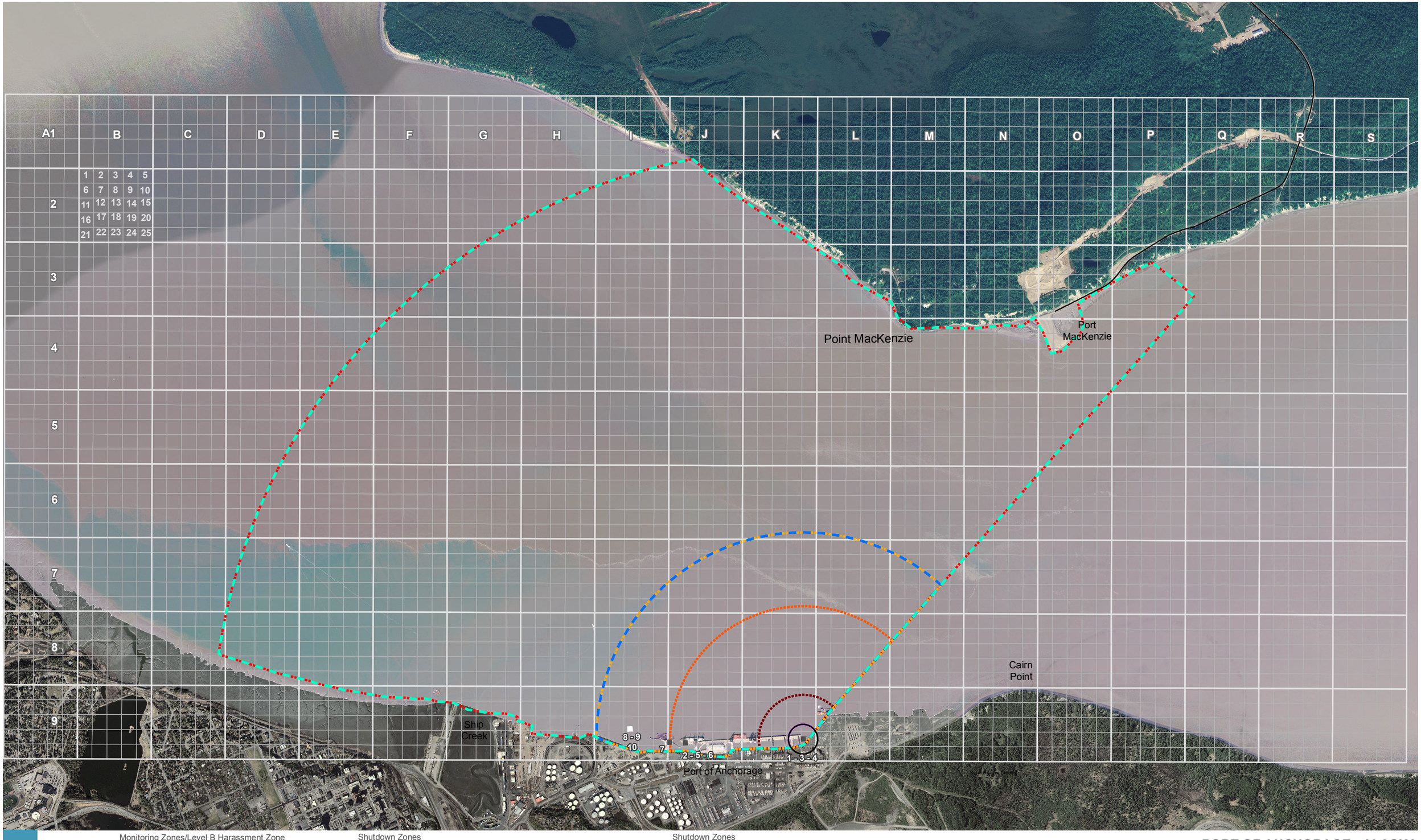
Attenuation Methods *(circle)* : None air bubble curtains encapsulated gas bubble cushion blocks resonance- based atten. sys.

SHUT DOWN or **DELAYED** from _____ to _____ (time)

NO SHUT DOWN, *EXPLANATION REQUIRED* :

Additional Information (include more detailed information on behavior, if applicable) :

Draw locations on hardcopy maps



Monitoring Zones/Level B Harassment Zone
Belugas and Other Mammals
- Impact - 1,400 m Attenuated and Unattenuated
- Vibratory - 4,000 m Attenuated and Unattenuated

NOTE: LEVEL A HARASSMENT ZONES ARE NOT DISPLAYED ON THE MAP.

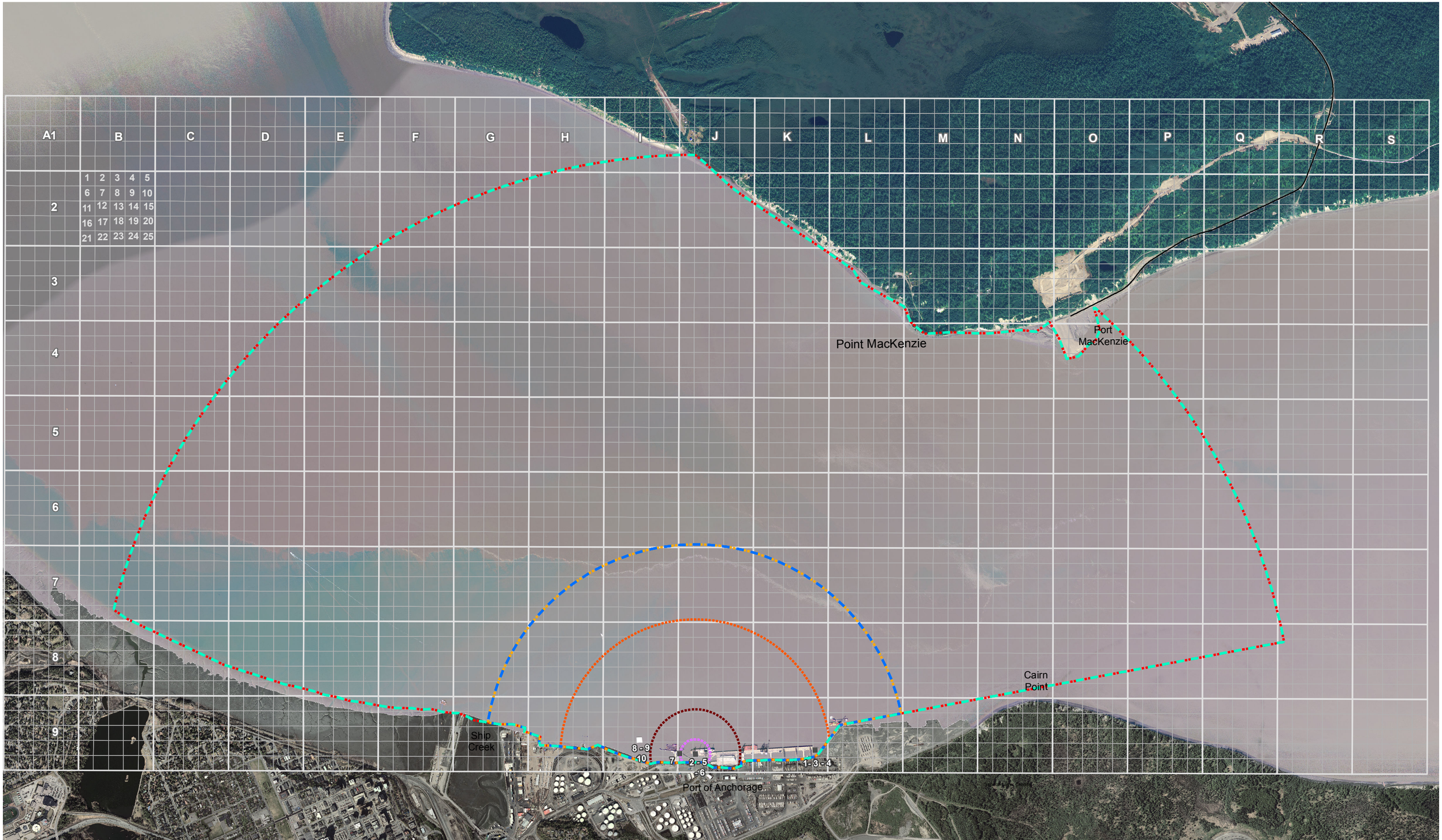
Shutdown Zones
Belugas
- Impact - 300 m Attenuated
- Vibratory - 900 m Attenuated
- Impact - 1,400 m Unattenuated
- Vibratory - 4000 m Unattenuated

Shutdown Zones
Other Mammals
- Impact/Vibratory - 100 m Attenuated and Unattenuated

0 Meters 500

PORT OF ANCHORAGE - ALASKA
ANCHORAGE PORT TEST PILE PROGRAM
MARINE MAMMAL MONITORING ZONES/LEVEL B HARASSMENT ZONE
FIGURE 1 OF 4

PATH: \\ANC-SRV04\PROJECT_SAN\425054 CH2M HILL\243127_PORTOFANCHORAGE\MAP_DOCS\DRAFT\MP4\POA_MONITORINGAREA_P3_4_TAB3.MXD - USER: TLILLY - DATE: 03/07/2016



Monitoring Zones/Level B Harassment Zone
Belugas and Other Mammals

- Impact - 1,400 m Attenuated and Unattenuated
- Vibratory - 4,000 m Attenuated and Unattenuated

NOTE: LEVEL A HARASSMENT ZONES ARE NOT DISPLAYED ON THE MAP.

Shutdown Zones
Belugas

- Impact - 300 m Attenuated
- Vibratory - 900 m Attenuated
- Impact - 1,400 m Unattenuated
- Vibratory - 4000 m Unattenuated

Shutdown Zones
Other Mammals

- Impact/Vibratory - 100 m Attenuated and Unattenuated

0 Meters 500

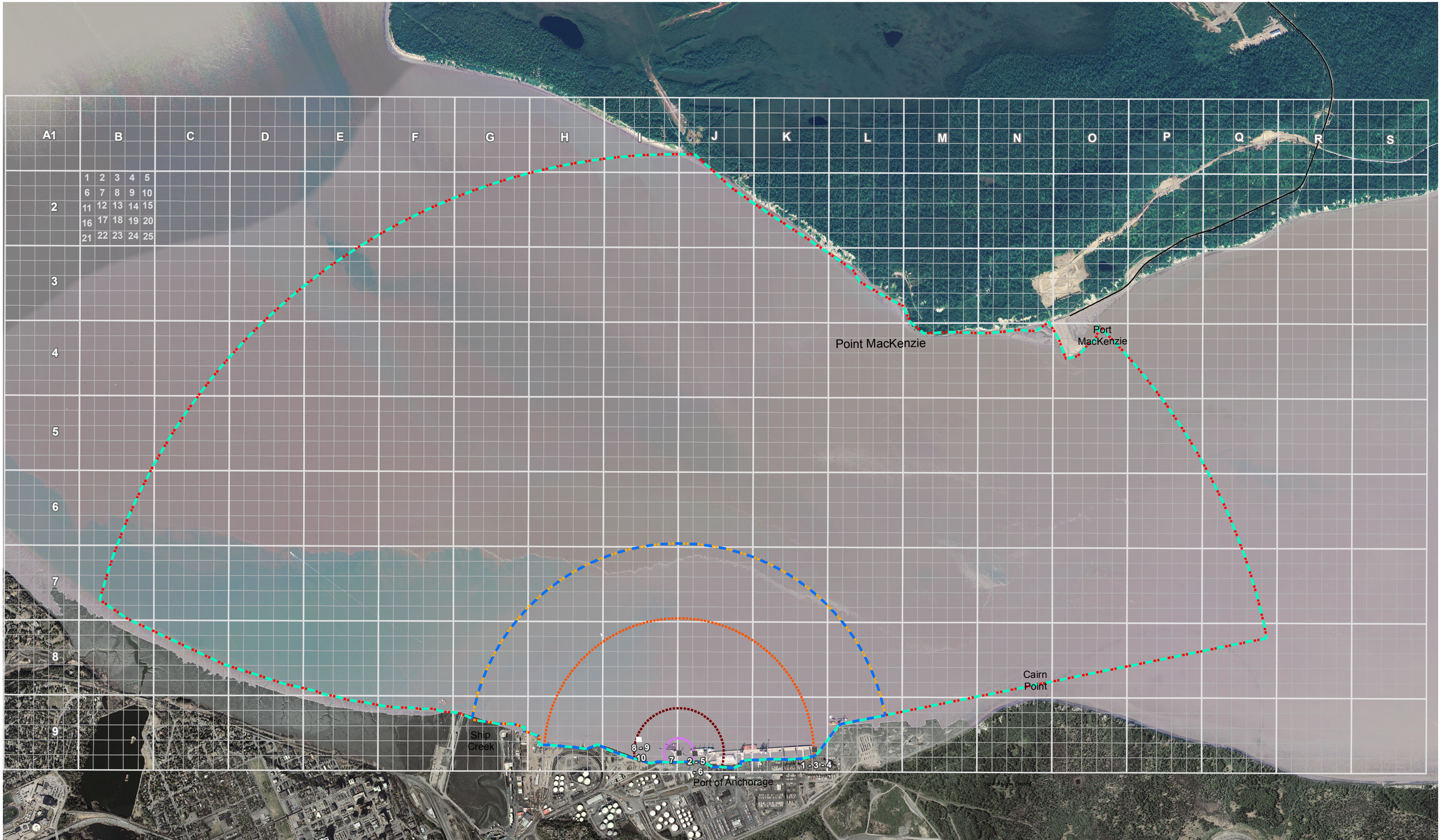
PORT OF ANCHORAGE - ALASKA

ANCHORAGE PORT TEST PILE PROGRAM

MARINE MAMMAL MONITORING ZONES/LEVEL B HARASSMENT ZONE

FIGURE 2 OF 4

PATH: \\ANC-SRV04\PROJECT_SAN\425054 CH2M HILL\243127_PORTOFANCHORAGE\MAP_DOCS\DRAFT\MP4\POA_MONITORINGAREA_P5_6_TAB3.MXD - USER: TLILLY - DATE: 03/07/2016



Monitoring Zones/Level B Harassment Zone

Belugas and Other Mammals

- Impact - 1,400 m Attenuated and Unattenuated
- Vibratory - 4,000 m Attenuated and Unattenuated

NOTE: LEVEL A HARASSMENT ZONES ARE NOT DISPLAYED ON THE MAP.

Shutdown Zones

Belugas

- Impact - 300 m Attenuated
- Vibratory - 900 m Attenuated
- Impact - 1,400 m Unattenuated
- Vibratory - 4000 m Unattenuated

Shutdown Zones

Other Mammals

- Impact/Vibratory - 100 m Attenuated and Unattenuated

0 Meters 500

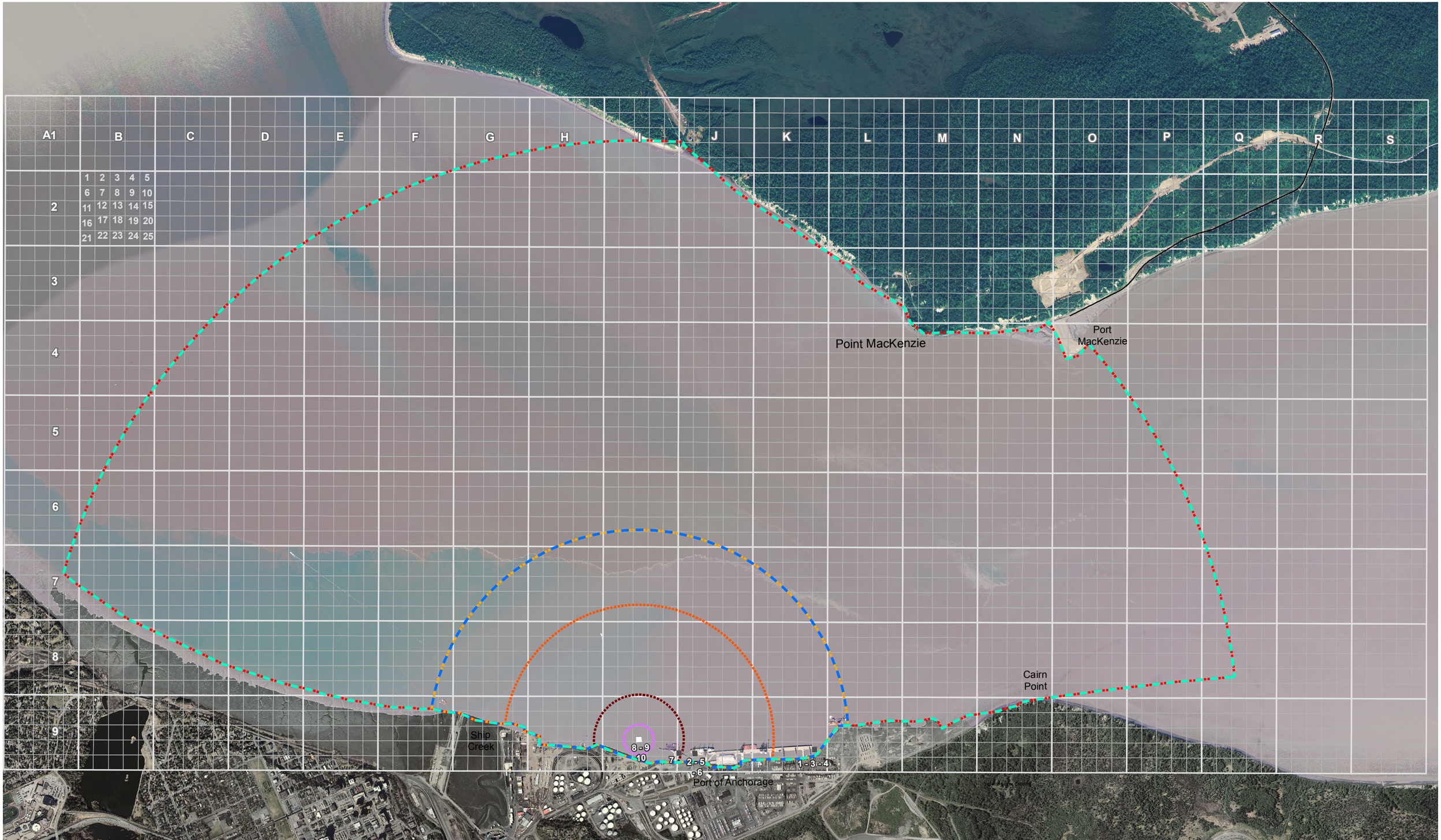
PORT OF ANCHORAGE - ALASKA

ANCHORAGE PORT TEST PILE PROGRAM

MARINE MAMMAL MONITORING ZONES/LEVEL B HARASSMENT ZONE

FIGURE 3 OF 4

PATH: \\ANC-SRV04\PROJECT_SAN\425054 CH2M HILL\243127_PORTOFANCHORAGE\MAP_DOCS\DRAFT\MP4\POA_MONITORINGAREA_P7_TAB2.MXD - USER: TLILLY - DATE: 03/07/2016



Monitoring Zones/Level B Harassment Zone
Belugas and Other Mammals
- Impact - 1,400 m Attenuated and Unattenuated
- Vibratory - 4,000 m Attenuated and Unattenuated

Shutdown Zones
Belugas
- Impact - 300 m Attenuated
- Vibratory - 900 m Attenuated
- Impact - 1,400 m Unattenuated
- Vibratory - 4000 m Unattenuated

Shutdown Zones
Other Mammals
- Impact/Vibratory - 100 m Attenuated and Unattenuated

NOTE: LEVEL A HARASSMENT ZONES ARE NOT DISPLAYED ON THE MAP.

0 Meters 500

PORT OF ANCHORAGE - ALASKA
ANCHORAGE PORT TEST PILE PROGRAM
MARINE MAMMAL MONITORING ZONES/LEVEL B HARASSMENT ZONE
FIGURE 4 OF 4

PATH: \\ANC-SRV04\PROJECT_SAN\425054 CH2M HILL\243127_PORTOFANCHORAGE\MAP_DOCS\DRAFT\MP4\POA_MONITORINGAREA_P8_9_10_TAB2.MXD - USER: TLILLY - DATE: 03/07/2016